

What is claimed is:

Sub B#

1. A pneumatic radial tire comprising a radial carcass comprised of at least one rubberized cord ply extending between a pair of bead cores embedded in a pair of bead portion and reinforcing a pair of sidewall portions and a tread portion, a belt reinforcing the tread portion at an outside of the carcass and comprised of three rubberized cord layers, an innermost cord layer and a middle cord layer among these cord layers being a cross cord layer that cords of the layers are crossed with each other with respect to an equatorial plane of the tire, and one or more circumferential grooves provided in at least each side region of the tread portion, characterized in that the cords of each of the innermost cord layer and the middle cord layer have an inclination angle of  $10-25^\circ$  with respect to the equatorial plane, and cords of an outermost cord layer have an inclination angle of  $45-115^\circ$  with respect to the equatorial plane as measured in the same direction as in the cords of the middle cord layer, and the outermost cord layer has a width extending toward an end of the tread portion over an outermost groove edge of an outermost circumferential groove in a widthwise direction of the tread portion.

2. A pneumatic radial tire according to claim 1, wherein a coating rubber for the cords of the outermost cord layer has a compression modulus of not less than  $200 \text{ kgf/cm}^2$ .

Sub E#

3. A pneumatic radial tire according to claim 1, wherein the outermost cord layer has a width covering both widthwise ends of the middle cord layer.

4. A pneumatic radial tire according to claim 3, wherein the width of the outermost cord layer corresponds to 1.0-1.2 times the width of the middle cord layer.

5. A pneumatic radial tire according to claim 3, wherein a rubber gauge between the cord at an end portion of the middle cord layer and the

JMBEL  
cord of the outermost cord layer adjacent thereto is not less than 0.15 time a rubber gauge between the cord at the end portion of the middle cord layer and the cord of the innermost cord layer adjacent thereto.

6. A pneumatic radial tire according to claim 1, wherein an end portion of at least one of the innermost cord layer and the middle cord layer is provided with an sheet-shaped end cover rubber enveloping such an end portion, and at least one surface of inner and outer surfaces of the cord layer end portion provided with the end cover rubber is a wavy surface forming a mountain part at a cord existing position and a valley part at a position between adjoining cords, and a difference of height between the mountain part and the valley part is within a range of 0.05-0.25 mm.

7. A pneumatic radial tire according to claim 1, wherein at least one of the innermost cord layer and the middle cord layer is provided with a rubber layer joined to a widthwise end face of the cord layer over a full periphery of the cord layer, and the rubber layer has a width of 0.05-5.00 mm.

8. A pneumatic radial tire comprising a radial carcass comprised of at least one rubberized cord ply extending between a pair of bead cores embedded in a pair of bead portion and reinforcing a pair of sidewall portions and a tread portion, a belt reinforcing the tread portion at an outside of the carcass and comprised of three rubberized cord layers, an innermost cord layer and a middle cord layer among these cord layers being a cross cord layer that cords of the layers are crossed with each other with respect to an equatorial plane, and at least two circumferential grooves provided in at least a central region of the tread portion, characterized in that the cords of each of the innermost cord layer and the middle cord layer have an inclination angle of 10-25° with respect to the equatorial plane, and cords of an outermost cord layer have an inclination angle of 45-115° with respect to the equatorial plane as measured in the same direction as in the cords of the middle cord layer, and

a cord layer line passing through a center of a thickness of the outermost cord layer at a radial section of the tire is either one of a curved line and a combined line of a curved line and a straight line, and a maximum distance from the cord layer line to a line segment connecting two intersects between the cord layer line and each of extended lines equally dividing a groove width of each of the adjoining circumferential grooves at a radial section of the tire having a state of fitting an outer width between the pair of the bead portions to a width of an approved rim is not more than 1 mm.

9. A pneumatic radial tire according to claim 8, wherein a coating rubber for the cords of the outermost cord layer has a compression modulus of not less than 200 kgf/cm<sup>2</sup>.

10. A pneumatic radial tire according to claim 8, wherein the cord layer line has a center of curvature located inward in the radial direction of the tire over a full width of the outermost cord layer.

11. A pneumatic radial tire comprising a radial carcass comprised of at least one rubberized cord ply extending between a pair of bead cores embedded in a pair of bead portion and reinforcing a pair of sidewall portions and a tread portion, a belt reinforcing the tread portion at an outside of the carcass and comprised of three rubberized cord layers, an innermost cord layer and a middle cord layer among these cord layers being a cross cord layer that cords of the layers are crossed with each other with respect to an equatorial plane, and a tread portion provided with a plurality of lateral grooves extending from an inside of the tread portion toward an end thereof, characterized in that the cords of each of the innermost cord layer and the middle cord layer have an inclination angle of 10-25° with respect to the equatorial plane, and cords of an outermost cord layer have an inclination angle of 45-115° with respect to the equatorial plane as measured in the same direction as in the cords of the middle cord layer, and an inclination angle of a

center line of a groove width of the lateral groove with respect to a plane parallel to the equatorial plane has an inclination angle difference of not less than  $20^\circ$  with respect to an axial line of the cord in the outermost cord layer having the above inclination angle with respect to the equatorial plane.

12. A pneumatic radial tire according to claim 11, wherein a coating rubber for the cords of the outermost cord layer has a compression modulus of not less than  $200 \text{ kgf/cm}^2$ .

13. A pneumatic radial tire according to claim 11, wherein the center line of the groove width of the lateral groove is crossed with the axial line of the cord in the outermost cord layer with respect to the plane parallel to the equatorial plane.

14. A pneumatic radial tire according to claim 11, wherein an end portion of at least one of the innermost cord layer and the middle cord layer is provided with a sheet-shaped end cover rubber enveloping such an end portion, and at least one surface of inner and outer surfaces of the cord layer end portion provided with the end cover rubber is a wavy surface forming a mountain part at a cord existing position and a valley part at a position between adjoining cords, and a difference of height between the mountain part and the valley part is within a range of 0.05-0.25 mm.

15. A pneumatic radial tire according to claim 11, wherein at least one of the innermost cord layer and the middle cord layer is provided with a rubber layer joined to a widthwise end face of the cord layer over a full periphery of the cord layer, and the rubber layer has a width of 0.05-5.00 mm.

16. A pneumatic radial tire comprising a radial carcass comprised of at least one rubberized cord ply extending between a pair of bead cores embedded in a pair of bead portion and reinforcing a pair of sidewall portions and a tread portion and a belt reinforcing the tread portion at an outside of the carcass and comprised of three rubberized cord layers, an innermost cord

layer and a middle cord layer among these cord layers being a cross cord layer that cords of the layers are crossed with each other with respect to an equatorial plane, characterized in that the cords of each of the innermost cord layer and the middle cord layer have an inclination angle of  $10-25^\circ$  with respect to the equatorial plane, and cords of an outermost cord layer are high-extensible cords and have an inclination angle of  $45-115^\circ$  with respect to the equatorial plane as measured in the same direction as in the cords of the middle cord layer.

17. A pneumatic radial tire according to claim 16, wherein a coating rubber for the cords of the outermost cord layer has a compression modulus of not less than  $200 \text{ kgf/cm}^2$ .

18. A pneumatic radial tire according to claim 16, wherein the high-extensible cord has an elongation at break of not less than 4%.

19. A pneumatic radial tire according to claim 16, wherein an end portion of at least one of the innermost cord layer and the middle cord layer is provided with an sheet-shaped end cover rubber enveloping such an end portion, and at least one surface of inner and outer surfaces of the cord layer end portion provided with the end cover rubber is a wavy surface forming a mountain part at a cord existing position and a valley part at a position between adjoining cords, and a difference of height between the mountain part and the valley part is within a range of  $0.05-0.25 \text{ mm}$ .

20. A pneumatic radial tire according to claim 16, wherein at least one of the innermost cord layer and the middle cord layer is provided with a rubber layer joined to a widthwise end face of the cord layer over a full periphery of the cord layer, and the rubber layer has a width of  $0.05-5.00 \text{ mm}$ .

21. A pneumatic radial tire comprising a radial carcass comprised of at least one rubberized cord ply extending between a pair of bead cores embedded in a pair of bead portion and reinforcing a pair of sidewall portions

and a tread portion, a belt reinforcing the tread portion at an outside of the carcass and comprised of three rubberized cord layers, an innermost cord layer and a middle cord layer among these cord layers being a cross cord layer that cords of the layers are crossed with each other with respect to an equatorial plane, and a pair of circumferential shoulder grooves formed on at least both side regions of the tread portion, characterized in that the cords of each of the innermost cord layer and the middle cord layer have an inclination angle of  $10-25^{\circ}$  with respect to the equatorial plane, and cords of an outermost cord layer are high-extensible cords and have an inclination angle of  $45-115^{\circ}$  with respect to the equatorial plane as measured in the same direction as in the cords of the middle cord layer, and the outermost cord layer has a width narrower than a width between groove edges of the circumferential shoulder grooves nearest to the equatorial plane.

22. A pneumatic radial tire according to claim 21, wherein a coating rubber for the cords of the outermost cord layer has a compression modulus of not less than  $200 \text{ kgf/cm}^2$ .

23. A pneumatic radial tire according to claim 21, wherein two circumferential central grooves extending so as to sandwich the equatorial plane of the tire therebetween are arranged in a central region of the tread portion and the width of the outermost cord layer is wider than a width between groove edges of the circumferential central grooves farthest from the equatorial plane.